

COMPOSITE REPAIR FOR PIPE REINFORCEMENT

According to ISO 24.817 & ASME PCC-2

DEFECT TYPE	External corrosion – 4 defects
PIPE DETAILS	24", 20" & 4.5" - Oil line – max. op. temp. 105°C - application temp. 60°C - design pressure 10 barg
LOCATION	VIET-NAM – FPSO
3X SOLUTION	REINFORCEKIT® 4D ECHT (R4D-ECHT) – High Temperature

OVERVIEW

The objective of the repair, performed in October 2018 by 3X ENGINEERING (3X) and its local distributor PETROENERTECH, was to **repair 4 external corrosion defects on 2 different lines (1 flare scrubber and 1 heat exchanger).**

SCOPE OF WORK

According to ISO 24.817 and 3X repair calculations, 4 layers of **REINFORCEKIT® 4D ECHT**, specifically dedicated to high temperature, have been determined to repair each of the 4 defects.

Surface preparation was completed using Bristle Blaster® machine to get a good surface roughness (between 60 and 100µm) and ensure the bonding between the pipe and the composite. Hygrometric conditions were measured and the surface was cleaned using acetone.

The composite repair for the 2 points of the flare scrubber (4.5" & 24") was then performed following several stages:

- 1 **F3X8 filler** application on fitting & vessel to get a smooth geometry.
- 2 Surface covered with **R3X1080 resin** to ensure a good wetting and impregnation of the Kevlar® tape.
- 3 Kevlar® strips application all around the surface (from the vessel to the straight line) to share the constraints.
- 4 Wrapping process covering the straight line was completed using **Kevlar® tape impregnated with R3X1080 resin (4 layers).**
- 5 Final protective layer of **R3X1080 resin** was applied all over the repair with reference plate positioning for traceability purpose.

The composite repair for the 2 defects (300x350mm & 5x5mm) situated on heat exchanger (24" – straight line) was performed following the same stages, except Step 3. The total repair length for these defects were respectively 850mm & 305mm.

RESULTS

The lines suffering from external corrosion were successfully repaired using our **REINFORCEKIT® 4D ECHT**. The challenge of these repairs was the specific geometries to be repaired added to high temperature application.



Figure 1: Kevlar® strips application (flare scrubber - part No. 1 of 4.5")



Figure 2: Composite wrapping finished (flare scrubber - part No. 2 of 24")



Figures 3 & 4: Composite wrappings finished on heat exchanger (2 defected areas)